



Published in final edited form as:

Perspect Sex Reprod Health. 2020 March ; 52(1): 39–48. doi:10.1363/psrh.12134.

Comparing Prospective and Retrospective Reports of Pregnancy Intention in a Longitudinal Cohort of U.S. Women

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Abstract

CONTEXT: Measurement of pregnancy intentions typically relies on retrospective reporting, an approach that may misrepresent the extent of unintended pregnancy. However, the degree of possible misreporting is unclear, as little research has compared prospective and retrospective reports of intention for the same pregnancies.

METHODS: Longitudinal data collected between 2010 and 2015 on 174 pregnancies were used to analyze the magnitude and direction of changes in intendedness (intended, ambivalent or unintended) between prospective and retrospective measurements of intendedness using versions of the London Measure of Unplanned Pregnancy (LMUP). Changes were assessed both continuously and categorically. Differences in the degree of change — by pregnancy outcome and participant characteristics — were examined using mixed-effects linear and logistic regression models.

RESULTS: Over two and one-half years of follow-up, 143 participants reported 174 pregnancies. Approximately half showed changes in intention between the prospective and retrospective assessments, with 38% of participants reporting increased intendedness and 10% decreased intendedness. Reported intendedness increased more among those who gave birth (mean change in continuous LMUP score, 2.2) than among those who obtained an abortion (0.7), as well as among individuals with a college degree (4.1) than among those with a high school diploma (1.2). Participants who reported recent depression or anxiety symptoms showed more stable intentions (0.02) than those who did not (2.1).

CONCLUSIONS: Retrospective measurement of pregnancy intentions may underestimate the frequency of unintended pregnancy, with such underestimation being greater among certain subgroups. Estimates based on retrospective reports thus may produce inaccurate impressions of intentionality. Further efforts to refine the measurement of pregnancy preferences are needed.

In the United States, just under one-half (45%) of pregnancies are estimated to have been unintended (unwanted or mistimed) at the time of conception, with higher proportions among people who were young, socioeconomically disadvantaged, and racial or ethnic minorities.¹ Historically, most research on pregnancy intention has relied on retrospective

assessment: asking people who are already pregnant or have given birth to think back to their intentions at the time just before they became pregnant. Such retrospective assessments have been criticized, most notably because an individual's recollection and perception of a conception can change during pregnancy, after childbirth or during child rearing.²⁻⁶ That is, intentions assessed retrospectively can be subject to ex post facto rationalization or to recall bias.⁷

An alternative and less often used approach to measuring pregnancy intentions is prospective assessment, in which nonpregnant individuals are asked prior to pregnancy about their attitudes toward a future pregnancy.⁸⁻¹⁰ Although this approach has the substantial advantage of establishing temporality between intentionality and conception, it is used much less often, because it requires following large cohorts of individuals longitudinally to capture significant numbers of pregnancies. As a result, prospective assessment is financially and practically infeasible in many contexts. Further, such an approach has its own set of limitations: An individual's attitudes toward pregnancy are not static and may change over time in response to other life circumstances.^{9,11-13} Some revision in prospective intention over time is to be expected, especially if the circumstances of a person's life related to partnership, finances and health status have shifted to make them feel more (or less) prepared to raise a child.¹¹ Thus, a prospective measure is likely most valuable when measured frequently and shortly before new pregnancies occur.

Given the intensive data requirements of prospective assessment, classification of intention will by necessity continue to rely on retrospective reporting, especially in the context of representative surveys that track population-level trends in unintended pregnancy and contraceptive use. Hence it is critical that we understand and quantify the extent to which retrospective reporting differs from prospective assessment, as well as whether the magnitude and direction of differences vary by sociodemographic characteristics and pregnancy outcome.

To our knowledge, only one U.S. study has examined changes in reporting between prospective assessment (prior to pregnancy) and retrospective assessment (after the new pregnancy occurs) using the same measure and among pregnancies ending in both birth and abortion.¹⁴ Unfortunately, its sample size (36 individuals) precluded investigation into the significance of such changes or the associations between any changes and women's sociodemographic characteristics. Two other studies compared prospective and retrospective assessments of pregnancy intendedness among women participating in large national surveys, but they included pregnancies ending in births only.^{15,16} These documented significant shifts in intention between prospective and retrospective reporting, with differences more pronounced among certain subpopulations, including African American, low-income and higher parity women.

Hypotheses about why retrospective intention assessments might reflect more positive feelings about pregnancy than prospective approaches have focused on arguments that individuals are less able or willing to report pregnancies as undesired after the fact. For example, Rackin and Morgan¹⁵ found that older, higher parity women in the 1979 National Longitudinal Survey of Youth were more likely than others to report large shifts in intention

from prospective to retrospective assessment, a finding they interpreted as being due to these women's familiarity with childrearing, ability to integrate the child into their lives and unwillingness to report a new pregnancy as unintended, even if it was not desired prospectively. Prospective assessments also may be vulnerable to social desirability bias, with individuals living in circumstances deemed socially less desirable for childbearing — for example, outside of a monogamous relationship or in financially unstable circumstances — being less willing to express the intention to have a child.¹⁷ Examining factors associated with changes in intention reporting from prospective to retrospective assessment can help researchers understand why such reports change and how these changes may differ across subpopulations.

This analysis uses longitudinal data from the Turnaway Study to examine differences in individuals' prospective and retrospective reports of intendedness about pregnancies occurring during the study follow-up period (referred to as incident pregnancies). Specifically, we contrast results from a purposefully developed and evaluated retrospective measure of pregnancy intention, the London Measure of Unplanned Pregnancy (LMUP), with those from a version of the LMUP adapted for use prospectively, the Prospective LMUP, to assess the degree to which reports of pregnancy intention differed when solicited prior to a pregnancy versus after the occurrence of a new pregnancy. We also examine differences in the magnitude and direction of change between assessments of intention by participants' characteristics and by pregnancy outcome. This work expands on previous research, which was limited to women who continued pregnancies and therefore may have had more favorable attitudes toward the pregnancy. Findings from this study can be used to quantify and address the extent to which recall issues may affect estimates generated using retrospective assessment of pregnancy intention.

METHODS

Data Collection

Data for this analysis were taken from the Turnaway Study — a five-year longitudinal cohort study examining the health and socioeconomic consequences of access to abortion.^{18,19} Between 2008 and 2010, people seeking abortions were recruited from 30 facilities across the United States. Individuals were eligible if they spoke English or Spanish, were at least 15 years old and were presenting for termination of a pregnancy with no known fetal abnormalities. Participants completed baseline telephone interviews approximately one week after recruitment and then semiannually for five years, for a maximum of 11 interviews.

Our analysis focuses on data collected in years 2 through 5 of follow-up, in which participants were asked every six months, both prospectively and retrospectively, about the intendedness of any new pregnancies. All participants provided informed consent. Study procedures were approved by the Committee on Human Research at the University of California, San Francisco.

Measures

• **Pregnancy intention.**—The outcome of interest was the intendedness of incident pregnancies occurring in years 2 through 5 of follow-up, for which we had both prospective and retrospective assessments of intentions. Participants could report multiple pregnancies during this time period. For retrospective assessment, we used the LMUP, a six-item measure of pregnancy intentions developed in the United Kingdom based on rigorous qualitative work; it has demonstrated high reliability and validity in both UK and U.S. settings.^{20–22} The measure consists of two items about behaviors (contraceptive use and health behaviors to prepare for pregnancy), two about context (timing of pregnancy and partner agreement about pregnancy), and two about intention (desire to have a baby and intention to get pregnant) at the time a new pregnancy occurred (see Table 4 for specific questions).²⁰ Responses for each item were assigned a value ranging from 0 to 2. Scores were then summed across items, resulting in overall scores ranging from 0 to 12, with a higher score indicating a more intended pregnancy. Although the developers recommend treating these scores as a continuum, they can also be categorized, with 0–3 being unintended, 4–9 being ambivalent and 10–12 being intended.²³ Following guidance from the developers,²⁰ we excluded assessments from participants who were missing responses to four or more items. Average scores on completed items were used to impute responses for those missing data on 1–3 items.

To measure pregnancy intentions prospectively, we adapted the LMUP items. Overall, items and response options were worded similarly between the Prospective LMUP (ProLMUP) and the LMUP; one notable exception is that the prospective items included revised introductory statements asking participants about their “current” behavior or reaction “in the next six months” if they became pregnant, rather than the time “just before [they] became pregnant.” As with the LMUP, we excluded participants who were missing responses to four or more items; we imputed missing values, summed responses across all items for an overall score (which could range from 0 to 12) and categorized scores as not intending (0–3), ambivalent (4–9) and intending (10–12).

The seven waves of data collection from years 2 through 5 included questions asking participants who were not currently pregnant their prospective intentions to become pregnant, using the ProLMUP; in each interview, participants also were asked to report retrospectively the intendedness of any pregnancies that had occurred since the prior interview. This design enabled direct comparison of ProLMUP and LMUP scores referencing the same pregnancies in interviews in years 2.5 through 5.

• **Change in pregnancy intention.**—The change in score between prospective and retrospective assessments was conceptualized in two ways. First, we calculated a continuous change score by subtracting the ProLMUP from the LMUP, so that a positive score reflected an increase in reported intendedness between assessments. Second, in line with other research,² we categorized changes in reports into five groups reflecting all possible patterns of change: always intended, always ambivalent, always unintended, less intended over time (intended to ambivalent, ambivalent to unintended and intended to unintended) and more intended over time (unintended to ambivalent, ambivalent to intended and unintended to

intended). Finally, for a sensitivity analysis, we created a hybrid variable categorizing continuous change scores based on their magnitude. Specifically, we collapsed continuous change scores and considered changes of -4 to -7 points as much less intended, -2 to -3 as slightly less intended, -1 to +1 as little change, +2 to +3 as slightly more intended, and +4 to +12 as much more intended.

At each semiannual interview, participants who reported an incident pregnancy since the prior interview were asked to report the outcome of the pregnancy — whether they miscarried, had an abortion, gave birth or were still pregnant. Among those who were still pregnant, the pregnancy outcome was assessed at subsequent interviews until an outcome was determined. Thus, participants were in various stages of pregnancy and decision making at the time they completed the retrospective LMUP. For a sensitivity analysis, we estimated a pregnancy outcome for those participants who did not report one directly, using a question about their plans for the pregnancy and their gestation at the time of their last survey.

• **Sociodemographic, partner and health characteristics.**—We included a number of variables measuring the circumstances of participants' lives that might have influenced their pregnancy desires. These characteristics were selected to be consistent with previous studies that examined changes in reporting over time^{2-4,15} and to capture the range of reasons often given for choosing abortion.^{24,25} The baseline interview included measures of a range of sociodemographic characteristics, including race, ethnicity and educational attainment, which were treated as time-invariant. Age and parity were also assessed; using data from each follow-up interview on new births and months elapsed since the last interview, we calculated time-varying parity and age at the time of each incident pregnancy. All interviews asked about other time-varying characteristics, including current employment and schooling status, as well as relationship status (in a romantic relationship with a main partner) and the quality of that relationship. Participants' household income relative to the federal poverty level was calculated from responses to questions about household size and income.

Because a number of health characteristics have been found to be associated with unintended pregnancy,²⁶⁻²⁸ we examined whether participants had experienced any form of intimate partner violence (IPV) in the past six months, problem alcohol use in the past month (as indicated by an AUDIT-C score of 3 or above, based on the frequency, timing and amount of drinking)²⁹ and clinically relevant symptoms of depression or anxiety in the past week (from the Brief Symptom Inventory, as indicated by a score of 2 or above on the depression or anxiety subscale).³⁰ In addition, we assessed participants' level of stress using the Perceived Stress Scale³¹ and emotional social support using the Multidimensional Scale of Perceived Social Support³² (continuous scores were generated for each).

Analysis

Because the ProLMUP has not been formally evaluated, we assessed its internal consistency using Cronbach's alpha; a threshold of 0.70 is considered evidence of acceptable internal consistency.³³ We also examined the distribution of responses to each item and on the scale

overall to assess whether the measure successfully differentiated participants' intention levels across all ranges of the scale.

For each incident pregnancy reported over the study follow-up, we compared LMUP scores to ProLMUP scores from the prior interview. We first compared continuous scores; the correlation between ProLMUP and LMUP scores was assessed using Spearman's rank correlation coefficient, given the nonnormal distribution of scores on both scales. We then examined the percentages of participants changing intention categories (intended, ambivalent or unintended) between the ProLMUP and LMUP.

To evaluate whether changes in intention reporting between assessments differed by pregnancy outcome, we employed bivariable mixed-effects linear regression models (for continuous change scores) and logistic regression models (for changes in intention categories), which accounted for clustering of observations (pregnancies) by participant. When examining changes in categorized intention, we used postestimation permutation tests to assess differences by specific level — for example, to compare whether the proportion reporting increasing intendedness differed between those who had given birth and those who had had an abortion. We then assessed differences in continuous change scores by sociodemographic, relationship and health characteristics, using a series of mixed-effects linear regression models. For time-varying covariates, we used participants' characteristics at the interview prior to the incident pregnancy, when ProLMUP was assessed.

We performed two sensitivity analyses to assess the robustness of findings to alternative parametrizations of changes in intention and pregnancy outcome. All analyses were conducted using Stata 15.

RESULTS

Sample Characteristics

Over the three years of observation, 143 participants reported 174 incident pregnancies for which both prospective and retrospective measures of intention were collected. Of all 479 incident pregnancies reported by 315 participants over five years in the Turnaway Study cohort,³⁴ 199 occurred after the interview in which we incorporated the ProLMUP (two years into follow-up). Among those pregnancies, 11 were missing both prospective and retrospective assessments and 14 were missing retrospective assessments, leaving 174 pregnancies as the final sample for this analysis.

At the interview at which participants reported their prospective pregnancy intentions, their mean age was 27, and they represented diverse racial and ethnic backgrounds (Table 1). Nearly three-quarters (73%) had ever given birth. One-quarter had less than a high school education, 40% were living below the federal poverty level and two-thirds were currently working or in school. Most (82%) had a main romantic partner; among those, nine in 10 described the quality of that relationship as good or very good. Six percent had experienced IPV in the past six months, 20% reported problem alcohol use in the past month and 10% had experienced clinically relevant depression or anxiety symptoms in the last week. Scores on the Perceived Stress Scale (mean, 4.3) reflected low to moderate stress; scores on the

Multidimensional Scale of Perceived Social Support (mean, 20.1) reflected high social support.

The average time elapsed between the prospective and retrospective assessments was 6.4 months (not shown). At the interview in which participants reported on their retrospective intentions, 36% had resolved the pregnancy (i.e., were no longer pregnant). Sixty percent were still pregnant and planned to continue the pregnancy; few reported that they were still pregnant and did not plan to continue the pregnancy (2%) or were still pregnant but did not indicate their plan for the pregnancy (2%).

Intention Scores and Categories

For participants' prospective intentions, the mean score on the ProLMUP was 4.0 (standard deviation, 3.5; Cronbach's alpha, 0.76), and scores were highly right-skewed (Table 2 and Figure 1); the median score was 3.0. Regarding their retrospective intentions, the mean score on the LMUP was 5.8 (standard deviation, 3.5). These scores also were right-skewed, with a median of 5.0, but the skew was less pronounced than for the ProLMUP. The Spearman rank correlation coefficient between continuous prospective and retrospective LMUP scores was 0.48, indicative of a positive relationship between scores (not shown). The average continuous change in intention from prospective to retrospective assessment was 1.9, suggestive of increasing intendedness.

When continuous ProLMUP scores were categorized, the results showed that 12% of participants intended to get pregnant in the next six months, 33% expressed ambivalence about getting pregnant and 55% indicated that they did not intend to get pregnant (Table 3). On the LMUP, 20% of individuals retrospectively described their pregnancy as intended and 30% as unintended, while 50% were ambivalent. Half of participants (52%) were consistent in reporting their intention status, prospectively and retrospectively — 23% as unintended, 20% as ambivalent and 9% as intended. Substantial proportions of individuals changed intentions between the two assessments, with 38% describing their pregnancies as more intended in retrospect than prospectively (27% moving from unintended to ambivalent, 5% from unintended to intended, and 6% from ambivalent to intended). Ten percent described their pregnancies as less intended in retrospect (7% from ambivalent to unintended, and 3% from intended to ambivalent). As can be seen in Figure 2, participants who prospectively described not intending to get pregnant or being ambivalent about pregnancy showed retrospective shifts in intentionality in all directions; however, none who prospectively described intending a pregnancy shifted to describing it as unintended at the retrospective assessment.

Between the prospective and retrospective assessments, the distribution of responses to individual items shifted. Participants reported recent consistent contraceptive use more often in the prospective assessment (47%) than in the retrospective assessment (11%). They also more often endorsed the statement that they did not want (or had not wanted) to have a baby in the prospective assessment than in the retrospective one (47% vs. 34% — Table 4).

Pregnancy Outcome and Change in Intention

Among the 174 incident pregnancies, 41% resulted in a birth, 15% in a miscarriage, 26% in an abortion and 18% in an unknown outcome (see Table 2). Most (74%) participants who had an unknown pregnancy outcome reported their incident pregnancy at the final, year 5 interview, and thus we did not have an opportunity to assess the outcome of that pregnancy at a subsequent interview.

We calculated continuous change scores to highlight differences in the magnitude of change between assessments by pregnancy outcome. Participants whose pregnancy ended in abortion experienced less change in their intention scores between prospective and retrospective assessment; their mean change score was 0.7, compared with 2.2 for those who gave birth ($p=.005$) and 2.3 for those who had a miscarriage ($p=.02$). Participants whose pregnancy ended in abortion also had lower scores on the ProLMUP compared with participants whose pregnancy ended in a birth (2.9 vs. 4.6, $p=.009$). The sensitivity analysis that collapsed continuous change scores into groups based on their magnitude produced similar results: Individuals whose pregnancy ended in abortion were the least likely to experience a large increase in intentionality (11% vs. 28–39%; Appendix Table 1 — Supporting Information).

In bivariable analysis, those whose pregnancy ended in abortion were more likely to report that it was always unintended (42%) than were those who gave birth (15%, $p<.001$) or who experienced a miscarriage (19%, $p<.001$ — see Table 2). Conversely, participants whose pregnancy ended in a birth were more likely to describe it as more intended in retrospect (40%) than were participants whose pregnancy ended in abortion (24%, $p<.001$). Results were consistent when using an estimated pregnancy outcome for those who did not directly report an outcome (Appendix Table 2 — Supporting Information).

Participant Characteristics and Change in Intention

Bivariable analyses showed that several sociodemographic, relationship and health characteristics were associated with change in pregnancy intention between assessments (Table 5). Average continuous change scores were larger (indicating a greater shift toward more intended) among those with a college degree (4.1) or some college (2.4) than among those with less than a high school education (1.7) or a high school diploma (1.2). Participants who did not have a main partner at the time prospective intentions were measured had significantly larger continuous change scores than those who did (3.0 vs. 1.6). The greater degree of change in reporting among those who did not have a main partner was driven largely by their having the lowest mean ProLMUP score of any group (1.8 vs. 4.5 among those with a main partner).

Finally, change scores were significantly greater among those without recent depression or anxiety symptoms than among those with recent symptoms (2.1 vs. 0.02). In fact, individuals who at the time prospective pregnancy intentions were assessed reported experiencing recent depression or anxiety symptoms had the smallest change in intentionality — or the greatest similarity in intentions between prospective and retrospective assessment — among all subgroups examined.

DISCUSSION

In this longitudinal cohort study of individuals who had previously sought an abortion, we found considerable differences between prospective and retrospective reporting of pregnancy intentions for 174 incident pregnancies, with mean LMUP scores almost 2 points higher on the 0–12 scale when reported retrospectively than when assessed prospectively. Intentionality shifted for nearly half of pregnancies between assessments: Participants were nearly four times as likely to report an increase rather than a decrease in intendedness between prospective and short-term retrospective measurement. Thus, our study indicates that using prospective and retrospective measures of intention for the same pregnancy can result in very different conclusions about the degree to which it was intended. While such shifts have been described in other studies examining changes in retrospective assessments over time^{3,4,35} or comparing prospective and retrospective assessments among those giving birth,^{15,16} our study is the first in the United States to document this phenomenon among individuals with varied pregnancy outcomes.

Notably, a pregnancy described prospectively as unintended can, when described in present time, become a wanted pregnancy.³⁶ Similarly, a pregnancy prospectively characterized as intended can later be characterized as undesired. Such changes reflect the actual time-varying nature of pregnancy desires and their responsiveness to life circumstances.^{8,9,11}

In contrast, we examined the limitations of a commonly used measure asking individuals to retrospectively report the intendedness of a pregnancy at the time of conception, and found widespread shifts toward reporting of more intended pregnancies once a new pregnancy occurs. Although our intention measure differs from the questions used in representative surveys to derive estimates of unintended pregnancy in the United States, our results may apply to other retrospective assessments of pregnancy intention. Further, they suggest that retrospective assessment may underestimate unintended pregnancy and thus the degree to which people desire contraception.³⁷ As national surveys increasingly adopt formally developed and evaluated measures of intention,³⁸ understanding the degree of underestimation associated with relying on retrospective assessments is critical.

Our finding that changes in intentionality from prospective to short-term retrospective assessment differed by pregnancy outcome also represents an important new contribution to the literature and builds on work conducted in other settings.¹² To date, no U.S. study examining changes in intentionality from prospective to retrospective assessment has included participants who had an abortion or experienced a miscarriage. Thus, our study offers a more representative profile of the stability of pregnancy intentions from prospective to retrospective assessment across all individuals who become pregnant, regardless of pregnancy outcome. Although those who carried pregnancies to term experienced higher degrees of change in intentionality between assessments, it is unclear whether these individuals conducted more post hoc adjustment of intentionality knowing they were carrying to term, or whether they chose to carry to term after revising their perception of desire.

Virtually all subpopulations examined in this analysis experienced increasing intentionality between prospective and retrospective assessment, providing evidence in favor of ex post facto rationalization. At the same time, our findings were not wholly consistent regarding the characteristics associated with greater increases in intendedness. For example, those with a college degree experienced larger increases than those with a high school diploma or less, which is consistent with prior research suggesting that individuals living in circumstances that might more easily allow them to adapt to and support a (or another) child are more likely to overestimate their intentions retrospectively.¹⁵ In contrast, those with a main partner actually experienced smaller increases in intentionality than those without a primary partner; this finding may be attributed to the fact that those in a partnership had far higher LMUP scores prospectively than did those without a partner. The only subgroup that experienced no change in intentionality between prospective and retrospective assessments were participants with recent depression or anxiety symptoms, suggesting that these individuals may be less likely to put a positive spin on a new pregnancy. In any case, further investigation into differential changes in the reporting of pregnancy intention is needed to understand the processes by which retrospective assessment overestimates intendedness.

Limitations and Strengths

This study has several limitations. First, the sample size of 174 pregnancies is relatively small, limiting our power to detect predictors of changes in intention over time. Future work with a larger sample will be important to confirm the associations observed in this analysis. Second, because follow-up interviews took place an average of six months apart, retrospective assessments of intention were gathered at varying points in pregnancy, sometimes after the pregnancy had been resolved. For these participants, we were unable to document exactly when shifts in intention occurred. Further, time elapsed after prospective reporting and before conception, so it is possible that prospective intentions changed after that assessment and before a new pregnancy occurred. In addition, underreporting of abortion is possible in this study; however, given that study participants were originally recruited at the time they sought a (prior) abortion, they may have been more comfortable reporting this stigmatized action than would participants in other surveys.

A final important limitation is that although the LMUP improves upon frequently used dichotomous intention questions focused on timing and wantedness,³⁷ it is oriented more toward capturing active planning of a pregnancy, a concept that does not resonate with many people.²¹ Indeed, research has highlighted that some individuals have mixed feelings, are uncertain or do not hold clear preferences about a possible future pregnancy.^{10,39–41} The LMUP thus might be less effective in measuring the preferences of such individuals. Furthermore, the LMUP was not developed for use as a prospective measure and has not undergone assessment as to whether the items actually capture how individuals conceptualize a possible future pregnancy.⁴² Because no prospective pregnancy intention instruments were available at the time of data collection — and because we wanted our prospective measure to be comparable to the most valid and reliable retrospective measure available to date — we relied on a version of the LMUP adapted for prospective use, as others have done.⁴³ Newer prospective measures focused on desire to avoid pregnancy offer

a more comprehensive assessment of prospective preferences,¹⁰ which may increase the validity of measurement in future research.

The study's limitations are balanced by its strengths. Our prospective assessment of intentions occurred soon before the incident pregnancy, minimizing concerns about the degree of change in intent between assessment and conception, while still providing a truly prospective assessment of orientation toward a future pregnancy. We used a validated retrospective measure of pregnancy intentions, one that was designed explicitly to capture more nuanced attitudes toward pregnancy and having a baby, including ambivalence. Further, because of the expansive and detailed data collected longitudinally in this study, we were able to measure changes in life circumstances and examine these as predictors of changes in intention. Finally, our study included a racially, ethnically and geographically diverse sample of low-income individuals.

Conclusions

In practice, researchers will continue to rely on retrospective measurement of pregnancy intention, because of feasibility considerations. This study — the first to investigate differences in prospective and retrospective assessments of intention using a purposefully developed and evaluated instrument — provides evidence that retrospective measurement likely underestimates the proportion of pregnancies that are unintended, with the degree of underestimation differing not only by pregnancy outcome, but also by the circumstances of individuals' lives. Further research is needed to confirm our results and systematically assess the degree to which intention reporting changes, so that estimates of unintended pregnancy can be interpreted accordingly. Until then, researchers and policy makers should interpret retrospective measurements with caution and assume some degree of underestimation of the extent of pregnancy unintendedness.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgments

The authors thank Rana Barar, Heather Gould and Sandy Stonesifer for study coordination and management; Mattie Boehler-Tatman, Janine Carpenter, Undine Darney, Ivette Gomez, Selena Phipps, Brenly Rowland, Claire Schreiber and Danielle Sinkford for conducting interviews; Jasmine Powell, Michaela Ferrari, Debbie Nguyen and Elisette Weiss for project support; and Jay Fraser for database assistance. We also thank the participating health care professionals for their assistance with recruitment. This study was supported by Building Interdisciplinary Research Careers in Women's Health grant K12 HD052163 from the Office of Research on Women's Health, Eunice Kennedy Shriver National Institute of Child Health and Human Development; the Wallace Alexander Gerbode Foundation; an anonymous foundation; and The David and Lucile Packard Foundation. The funders had no role in study design, data collection and analysis, decision to publish or preparation of the manuscript.

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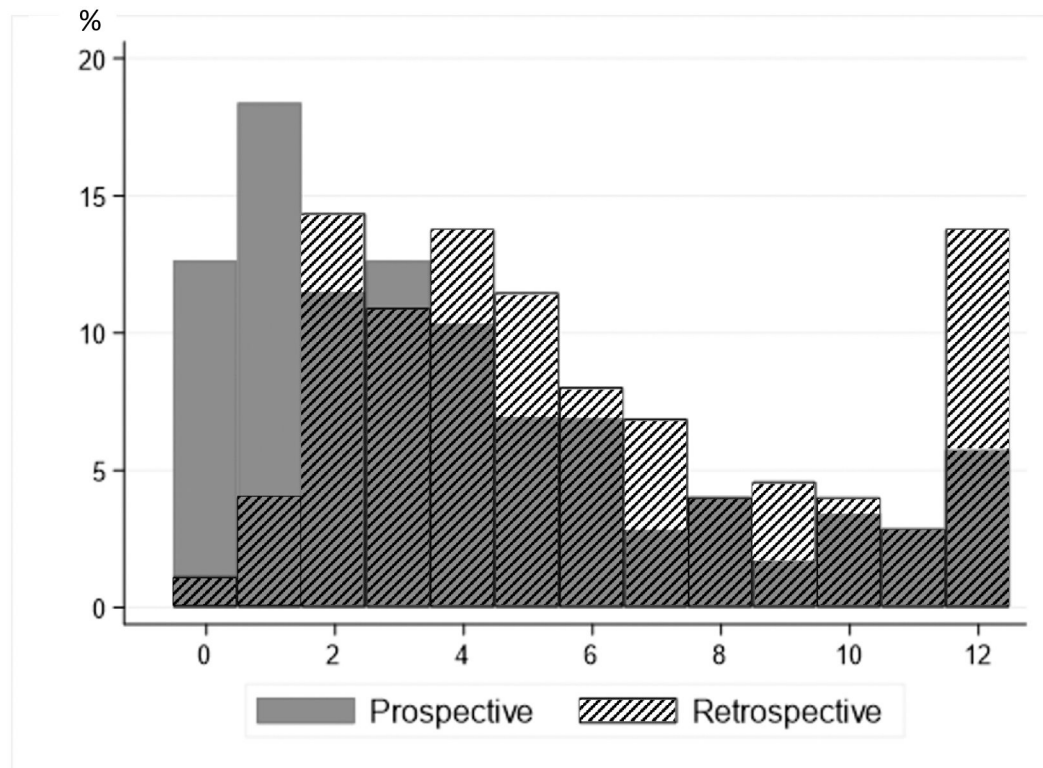


FIGURE 1.
Distribution of scores on the prospective and retrospective London Measure of Unplanned Pregnancy
Notes: Scores can range from 0 to 12; a higher score indicates a pregnancy that is more intended. The distributions of prospective and retrospective scores are shown as overlapping (i.e., bars are not additive); gray bars indicate prospective scores, and striped bars indicate retrospective scores.

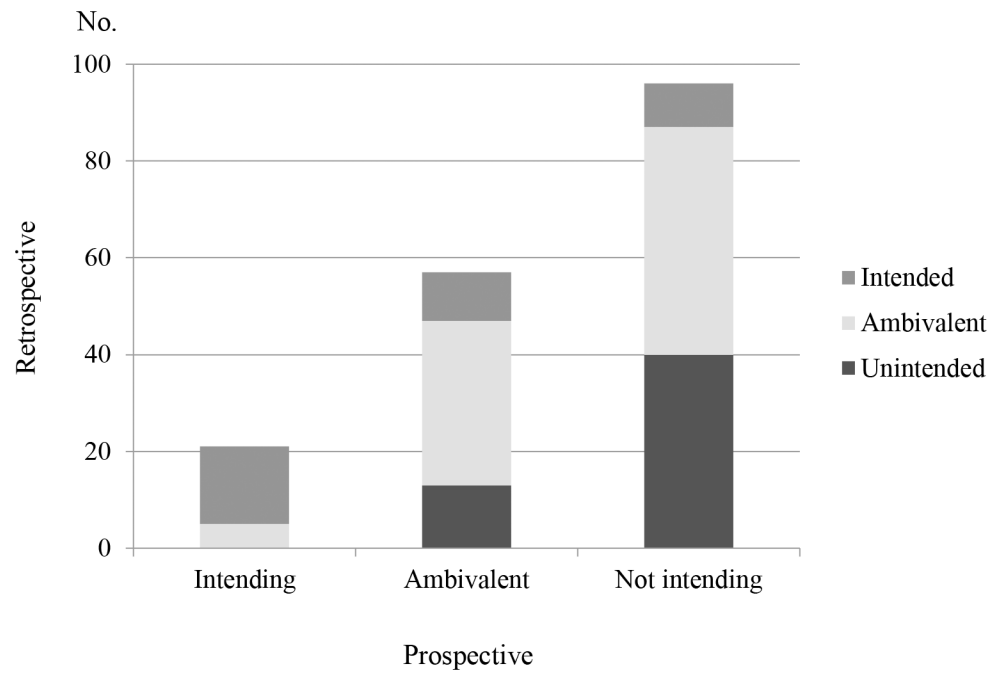


FIGURE 2.
Change in categorical scores on the prospective and retrospective London Measure of Unplanned Pregnancy

TABLE 1.

Selected sociodemographic, partner and health characteristics of participants who experienced incident pregnancies in years 2–5 of the Turnaway Study, 2010–2015

Characteristic	%
Mean age (range, 19–41)	26.8 (4.9)
Race/ethnicity	
White	36
Black	30
Latina	24
Multiethnic/other	10
Parity	
0	27
1	32
≥2	41
Educational attainment	
<high school	25
High school/GED	34
Associate's degree/some college/technical school	36
College degree	5
Household income as % of federal poverty level	
<100	40
≥100	36
Missing	24
Employed or in school	
Yes	67
No	33
Has main partner[†]	
Yes	82
No	18
Quality of relationship with main partner[‡]	
Very good	57
Good	33
Fair	8
Poor/very poor	2
Experienced IPV in past six months	6
Experienced problem alcohol use in past month[§]	20
Described symptoms of depression or anxiety in past week^{††}	10
Mean Perceived Stress Scale score (range, 0–16)^{‡‡}	4.3 (3.6)
Mean Multidimensional Scale of Perceived Social Support score (range, 0–24)^{§§}	20.1 (3.9)

[†]n=173.

[‡]n=142.

[§] Defined as an AUDIT-C score of 3 or above, based on frequency, timing and amount of drinking.²⁶

^{††} Assessed using the depression and anxiety subscales of the Brief Symptom Inventory.²⁷

^{‡‡} A higher score indicates more stress.²⁸

^{§§} A higher score indicates more support.²⁹

Notes: Data were collected on 174 pregnancies reported by 143 participants. Figures are percentages unless otherwise indicated; figures in parentheses are standard deviations. Race, ethnicity and educational attainment were assessed at the baseline survey; all other characteristics were assessed at the interview in which prospective intention was measured, prior to the report of the incident pregnancy. IPV=intimate partner violence.

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TABLE 2.

Mean prospective and retrospective pregnancy intention scores, change in scores and percentage distribution of pregnancy outcomes by intention status

Pregnancy outcome	Mean continuous ProLMUP score	Mean continuous LMUP score	Continuous change score (LMUP—ProLMUP)	Categorical change in intention					Overall % distribution of pregnancy outcomes
				% always intended (n=16)	% always ambivalent (n=34)	% always unintended (n=40)	% less intended [†] (n=18)	% more Intended [‡] (n=66)	
Overall	3.99	5.84	1.85	9	20	23	10	38	100
Birth (n=72)	4.64	6.86	2.22	19	21	15	4	40	41
Miscarriage (n=26)	2.96	5.27	2.31	0	15	19	15	50	15
Abortion (n=45)	2.94	3.63	0.68	0	20	42	13	24	26
Not reported (n=31) [§]	4.83	7.16	2.33	6	19	16	16	42	18

[†]Includes intended to ambivalent, ambivalent to unintended, and intended to unintended.

[‡]Includes unintended to ambivalent, ambivalent to intended, and unintended to intended.

[§]Missing data occurred primarily because the incident pregnancy was reported at the final, year 5 interview (23 of 31, 74%), which prevented assessment of pregnancy outcome at a subsequent interview. Appendix Table 2 presents a sensitivity analysis with several assumptions about the missing data on pregnancy outcome.

Notes: Because of rounding, percentages may not add to 100. ProLMUP=prospective London Measure of Unplanned Pregnancy. LMUP=London Measure of Unplanned Pregnancy.

TABLE 3.

Percentage of pregnancies by prospective pregnancy intention category (ProLMUP), according to retrospective intention category (LMUP)

Prospective category	Retrospective category			
	Unintended	Ambivalent	Intended	Overall
Not intending	<i>23</i>	<i>27</i>	<i>5</i>	55
Ambivalent	<i>7</i>	<i>20</i>	<i>6</i>	33
Intending	<i>0</i>	<i>3</i>	<i>9</i>	12
Overall	30	50	20	100

Notes: Italicized percentages represent the proportion of the whole sample (N=174) with that response pattern; the other percentages represent the column and row distributions. ProLMUP=prospective London Measure of Unplanned Pregnancy. LMUP=London Measure of Unplanned Pregnancy.

TABLE 4.

Distribution of participants' responses to items of the prospective and retrospective London Measure of Unplanned Pregnancy

Prospective LMUP	%	Retrospective LMUP	%
Q1. In the last month, how would you describe your use of contraception? Would you say that...		Q1. In the month you became pregnant, would you say that...	
You have not been using contraception	20	You were not using contraception	55
You have been using contraception, but not on every occasion (like you sometimes used condoms or you missed some pills)	20	You were using contraception, but not on every occasion (like you sometimes used condoms or you missed some pills)	24
You always have been using contraception but know that the method failed at least once (like the condom broke)	2	You always used contraception but know that the method failed at least once (like the condom broke)	9
You have always used contraception	47	You always used contraception	11
Don't know/refused	11	Don't know/refused	0
Q2. If you found out you were pregnant in the next six months, would you feel that the pregnancy happened at the...		Q2. In terms of becoming a mother, do you feel that the pregnancy happened at the...	
Right time	24	Right time	32
Ok, but not quite right time	45	Ok, but not quite right time	40
Wrong time	30	Wrong time	26
Don't know/refused	1	Don't know/refused	2
Q3. How would you describe your intention to become pregnant in the next six months? Would you say that...		Q3. Just before you became pregnant, would you say that...	
You intend to get pregnant	17	You intended to get pregnant	20
Your intentions keep changing	20	Your intentions kept changing	27
You do not want to become pregnant	63	You did not want to become pregnant	52
Don't know/refused	0	Don't know/refused	1
Q4. How would you describe your feelings about having a baby in the next six months? Would you say that...		Q4. Just before you became pregnant, would you say...	
You want to have a baby	21	You wanted to have a baby	30
You have mixed feelings about having a baby	32	You had mixed feelings about having a baby	35
You do not want to have a baby	47	You did not want to have a baby	34
Don't know/refused	0	Don't know/refused	1
Q5. For this question, please think about your main partner, or your husband, boyfriend, or main person you have sex with. Would you say that...		Q5. Just before you became pregnant, would you say that...	
You and your partner have agreed for you to become pregnant	18	You and your partner agreed that you would become pregnant	29
You and your partner have agreed that you should not become pregnant	24	You and your partner agreed that you would not become pregnant	11
You and your partner have discussed having children together but have not come to an agreement	33	You and your partner had discussed having children together but had not come to an agreement	34
You have never discussed having children together	13	You never discussed having children together	25
No partner	12	Don't know/refused	1
Don't know/refused	0		
Q6. Are you doing anything currently to improve your health in preparation for pregnancy? Are you:		Q6. Before you became pregnant did you do anything to improve your health in preparation for pregnancy? Did you:	
Taking folic acid	13	Take folic acid	18

Prospective LMUP	%	Retrospective LMUP	%
Stopping or cutting down on smoking	4	Stop or cut down on smoking	10
Stopping or cutting down on drinking alcohol	6	Stop or cut down on drinking alcohol	30
Eating more healthily	13	Eat more healthily	20
Seeking medical/health advice	9	Seek medical/health advice	10
Taking some other action	8	Take some other action	6
No. of behaviors:		No. of behaviors:	
	0 79		0 71
	1 8		1 4
	2 13		2 24

Notes: All retrospective questions were introduced with the following statement: "Next I have some questions about your situation and feelings around the time you became pregnant." Because of rounding, percentages may not add to 100. ProLMUP=prospective London Measure of Unplanned Pregnancy. LMUP=London Measure of Unplanned Pregnancy.

TABLE 5.

Mean prospective and retrospective pregnancy intention scores, and continuous change scores, by selected characteristics

Characteristic	Mean prospective intention score (ProLMUP)	Mean retrospective intention score (LMUP)	Continuous change score (LMUP–ProLMUP)
Age			
15–19	2.29	5.14	2.85
20–24	4.12	5.38	1.25
25–29	3.98	6.36	2.37
30–34	3.83	5.91	2.09
35–41	4.53	6.23	1.69
Race/ethnicity		*	
White	4.41	6.40	1.99
Black	3.28	4.79	1.51
Latina	4.05	6.68	2.63
Multiethnic/other	4.47	5.04	0.57
Parity	**	**	
0	5.28	7.15	1.87
1	3.78	6.33	2.54
≥2	3.29	4.61	1.33
Educational attainment			*
<high school	3.50	5.18	1.68
High school/GED	4.53	5.69	1.15
Associate's degree/some college/ technical school	3.81	6.17	2.37
College degree	4.00	8.10	4.10
Household income as % of federal poverty level		**	
<100	3.42	4.89	1.46
≥100	4.22	6.72	2.50
Missing	4.55	6.09	1.53
Employed or in school			
Yes	3.97	5.93	1.96
No	4.01	5.66	1.64
Has main partner	***	*	*
Yes	4.48	6.05	1.57
No	1.77	4.73	2.96
Change in quality of relationship with main partner since last interview[†]			
No change	3.87	5.91	2.03
Better quality	3.82	5.93	2.12
Worse quality	4.59	5.48	0.89
Experienced IPV in past six months			
Yes	2.45	4.18	1.72

Characteristic	Mean prospective intention score (ProLMUP)	Mean retrospective intention score (LMUP)	Continuous change score (LMUP–ProLMUP)
No	4.09	5.95	1.87
Experienced problem alcohol use in past month			
Yes	4.14	5.34	1.19
No	3.95	5.97	2.02
Experienced depression/anxiety in past week		*	**
Yes	3.97	4.08	0.02
No	4.05	6.04	2.07
Change in stress since last interview			
No change	3.79	6.52	2.73
Increase in stress	3.84	5.47	1.63
Decrease in stress	4.31	5.84	1.53
Change in social support since last interview		*	
No change	4.48	6.48	1.99
Increase in support	3.72	5.97	2.25
Decrease in support	3.68	4.96	1.28

*
p<.05.

**
p<.01.

p<.001.

[†]
n=142.

Notes: Except for the change measures, values represent status at the interview in which prospective intention was measured, prior to the report of the incident pregnancy. ProLMUP=prospective London Measure of Unplanned Pregnancy. LMUP=London Measure of Unplanned Pregnancy. IPV=intimate partner violence.